Outstanding Features in

This Month's Issue

Compression Testing

Discusses the proper interpretation of results in testing the behavior of fabrics and fiber masses during compression and the recovery therefrom. (See page 2.)

Improvement in Rayon

A solution of cellulose acetate was separated into fifteen fractional parts, each differing from the other in length of molecules. This first step may lead to building fibers of controlled molecular length and greater strength and elasticity. (See page 10.)

Improved Tests for Rotting and Mildew

Describes an improved method for testing the growth of fungi in cellulose. Suggests need of adopting standard test methods. (See page 13.)

Interrelated Research

The research laboratories of Interchemical Corp. are organized to prevent the pigeon-holing of ideas. (See page 20.)

Postwar Problems

A brief outline of some of the more important studies that are being undertaken by different organizations in the field of post-war planning. (See page 27.)

Determination of Resilience
Of Textiles by

Compression Testing

By K. R. FOX, S.M., AND E. R. SCHWARZ, F.T.I.*

NEW FIBERS, NEW FABRIC CONSTRUCTION, NEW FINISHES, and new uses for textiles, all have called for new test methods. Now assuming a place of importance is compression testing. Compression testing gives valuable information on the crush resistance of dress goods; effect of construction and finishing treatment on pile fabrics; resilience of nap on blankets and of bulk material used for stuffing mattresses and upholstery; and flexibility of fibers, yarns and fabrics in bending under pressure. The majority of the methods employed in compression testing involve compressing the material, recording the corresponding changes in thickness and load, and then removing the load while noting the subsequent recovery in thickness. Such data provide the information necessary for the conventional load-deformation curves.

Interpreting Load-Deformation Curves

Interpretation of these diagrams is quite difficult, because of the complex nature of the relationship of the deforming force and the resulting deformation. Several methods (1) of approach have been advanced, but each apparently has its limitations. With the increasing recognition of the importance of the time factor (2), in textile

* Textile Division, Massachusetts Institute of Technology.

This paper was written in connection with a program sponsored by The Textile Foundation.

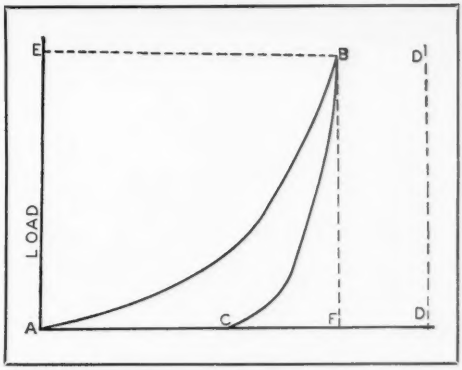


Fig. 1. Typical load deformation diagram

testing, it appears evident that this effect must also be considered for an intelligent interpretation of compression test diagrams. Further statistical methods for planning the tests and analyzing the data must be wisely used.

A typical load-deformation diagram is shown in Fig. 1. The curve *AB* represents the loading portion of the cycle and the curve *BC* the unloading. If the line *DD* represents the maximum theoretical deformation of the sample, the distance *AD* will represent the thickness of the sample at the start of the test. Likewise, *CD*, will be the thickness at the end of the cycle. It follows that the distance *AC* indicates the unrecovered thickness at the instant zero load was reached. The maximum amount of penetration during the cycle is shown by the distance *EB*. The amount of energy expended in deforming the sample can be indicated by the area under the compression curve *AB*. The energy recovered or returned to the machine is shown by the area under the recovery curve *BC*. The difference between these two energies is lost work, and is shown graphically by the area of the compression loop.

The ratio of the energy recovered to the energy expended expressed in per cent is often called the resilience. It is also customary to express the ratio of penetration to the thickness at no load, as compressibility. Other in-

vestigators have taken the thickness at the end of the recovery curve as a measure of bulk and use this criterion to determine the quality of the material being tested. Still others have used the recovery distance *CF* as an indication of the springiness of the material. Each of these physical concepts of the diagram has some merit, but too much emphasis should not be placed on any one.

An objection to the use of simple "end point" deformations is that these do not show the "ease" of compression. Depending upon the character of the material under test, the energy required to produce a given deformation (or that given up by the material upon its recovery to a given point) may vary in amount, depending upon the shape of the load-deformation curve. The shape of the curve is therefore extremely important, but since this is influenced to some extent by the rate and smoothness of load application these factors should be carefully specified and controlled. Otherwise there will not be agreement between tests, even on the same material.

The Time Factor

If, after application, the load is reduced or removed entirely, there will be a change in deformation of the nature of a recovery which will progress systematically with time. A time-deformation curve can be plotted, and its form will give information of value regarding the resilience of the material. This will be so because the term "resilience" connotes a certain speed of recovery as well as degree or ease.

The difficulty of determining the initial volume or thickness of a material under no load has led to the general adoption of an initial small load. For masses of bulk fiber, for example, this is not particularly satisfactory. This is because only a partial change of volume is brought about, and it is possible to get quite different initial conditions as to bulk on repeat tests on the same or other samples of the material under test. Hence the data of the first cycle—particularly that part of it produced during application of load—is uncertain.

If at the end of the first cycle the same loading and unloading is repeated, another loop will result with entirely different characteristics. As the loading and unloading is continued and the loops approach each other more closely, and—usually—at about the fifth or sixth

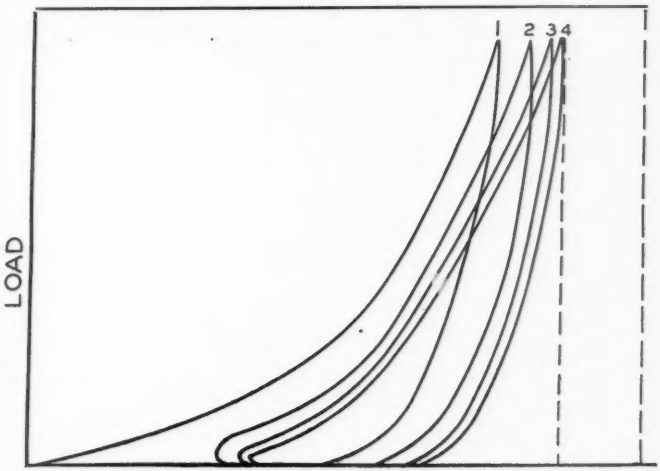


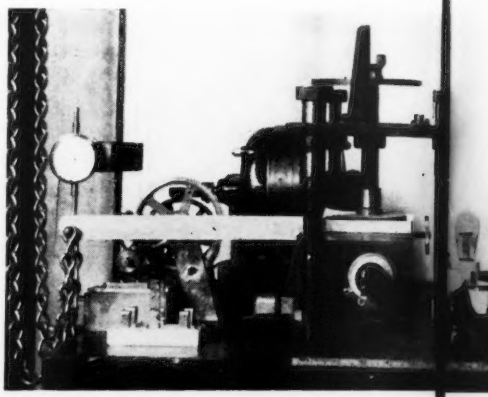
Fig. 2. Effect illustrated of repeated loadings

cycle the loops will be practically superimposed. This is shown by Fig. 2. This repeating cycle can be thought of as a mechanically conditioned cycle, i.e. through a mechanical action, namely, compression, the material tested can be made to reproduce its characteristics. It follows, then, that through a treatment of repeated cycles in which time is the important factor, data can be obtained which appear to be most reliable for comparing different samples or different conditions of testing on similar samples. The number of cycles necessary to obtain the superimposed loops may be a significant measure of difference between materials.

Compression testing of textiles is subject to the common variables of the atmosphere; namely, temperature and humidity. It is desirable, therefore, that such tests

be conducted under the usual standard test conditions. The nature of load used in compressing the sample—whether it be at a constant or variable rate—affects the test results. Again, load magnitude—expressed either in a stress intensity or load rate—should not be overlooked. It is conceivable that of two test specimens, one might show more advantageously at a lower stress intensity or ultimate load, but this relationship might be reversed at a higher load. In this instance, an inferior fabric sample would possess less desirable crush-resisting properties, even though it might appear to be a better fabric at lower pressures.

When testing bulk fiber, the conditions of the stock as to cleanliness or state of aggregation should be considered. Wool in the grease is quite different from scoured wool from the dryer, or after further processing. Cotton from a new bale will exhibit different properties from cotton as delivered from a picker. The quality of wool and the staple length and denier of, say, rayon definitely affect the compressional properties under test. Intelligent conduct of tests is possible only through recognition of all possible variables.



Latest compressional testing appa sting f

Statistical Concepts

Data from any test are valueless unless the results are correctly interpreted. Results of a most carefully designed experiment from a mechanical point of view can be wasted by an indiscriminate handling of data. Good technique requires careful planning and execution of the

sampling procedure in order to avoid biased results. This does not suggest complete randomization of samples in every test conducted, but, rather, the method of sampling should fit the purpose of the test.

Test	Sample Number				
Energy expended	2	1	3	4	5
Deformation	1	2	4	3	5
Time of recovery	2	1	4	3	5
Cycles necessary	1	2	3	4	5

apparatus for testing fabrics at M.I.T.

When a comparison between a laboratory test and the results of a service test is to be made, a method of measurement may be chosen according to the dictates of good judgment. However, if the basic properties of a number of materials are to be considered, it is suggested that the technique of rank correlation (3) be employed. Suppose, for example, that five materials are to be studied as to resilience. Let each one be rated in numerical order of excellence by each of the four suggested techniques as shown in the above table. This will show whether or not all the samples behave essentially alike for all concepts of resilience measurement. Then further analysis can be made statistically with assurance.

(1) "An Instrument for the Study of Compressional Creep and Creep Recovery of Yarns and Fabrics." K. R. Fox and E. R. Schwarz, *Textile Research*, Vol. XI, No. 5, pp. 227–237 (1941).

(2) "Textile Materials and the Time Factor." H. Leaderman, *Textile Research*, Vol. XI, No. 4, pp. 171–193 (1941).

(3) "Technical Evaluation of Textile Finishing Treatments.—III. Use of Rank Correlation for Comparison of Data." L. J. Winn and E. R. Schwarz, *Textile Research*, Vol. X, No. 11, pp. 453–461 (1940).

RESEARCH ACTIVITIES

Dr. Henry G. Knight, chief of the U. S. Agriculture Department's Bureau of Agricultural Chemistry and Engineering since 1927, died July 13, after a brief illness. A year ago, Dr. Knight received the medal of the American Institute of Chemists presented annually, "for noteworthy and outstanding service to the science of chemistry or the profession of the chemist in America." He was a past president of the American Institute of Chemists and during the last few years had charge of organizing and establishing the four regional research laboratories of the Department of Agriculture.

That the Philadelphia Textile School will hereafter be known as the Philadelphia Textile Institute, has been announced by M. Earl Heard, dean.

Paul T. Biggers, a graduate of the Textile School of North Carolina State College, who has been research associate on the warp sizing research project now being conducted at that institution under the sponsorship of the Textile Research Institute, Inc., has been commissioned as an ensign in the United States Naval Reserves.

As part of a program to develop new sources of natural grown fibers on this hemisphere, the Board of Economic Warfare has sent a mission around the Caribbean to investigate possibilities of increasing fiber supplies.

Structure and Chemistry of Textile Fibers was one of a series of special research conferences on chemistry and its allied fields, held at Gibson Island under the auspices of the American Association for the

Advancement of Science. The conference on Textile Fibers was held July 13 to July 17, 1942 under the direction of Milton Harris, Chairman, and H. Spurlin, Vice-Chairman. Speakers and subjects were: Herbert Leaderman, Crepe Phenomena in Fibers and Other High Polymeric Substances; Lyman E. Fourt, Molecular Interpretations of Some Mechanical Properties of Fibers; W. F. Busse, Fatigue of Fabrics; C. S. Fuller, Relation Between Structure and Properties of Linear Polyamides; Roy H. Kienle, Observations on the Mechanism of Dyeing; Donald H. Powers, Application of Resins and Resinous Products to Textile Fibers; Harvey A. Neville, Role of Anionic and Cationic Agents in Textile Processing; Henry A. Rutherford, Nature of the Degradation of Cellulose by Oxidative Processes.

Joseph L. Haas, technical director of the Hodgman Rubber Co., Framingham, Mass., has announced a new process developed by that company, for waterproofing of fabrics. The Hodgman process is a special application of a synthetic resin—a plastic known as Saflex—manufactured by Monsanto Chemical Co. Fabrics coated with this material are said to pass government specifications for raincoat material and to save more than 1 3/4 pounds of rubber per coat.

A completely equipped laboratory has been established by J. P. Stevens & Co., at 350 Hudson St., New York. This laboratory is designed exclusively for the inspection, testing and checking of all types of nylon escape chute, rayon fragmentation, bomb load and flare chute fabrics and cartridge cloths woven by mills operated by the company in the south. A description of this laboratory is given in Rayon Textile Monthly, July 1942.

Research on Fractionation of Cellulose Acetate Points Way to

Improvement of Rayon

A BEAVER DAM made of very long twigs, with a consequent opportunity for greater intermeshing, would be more difficult to pull apart than one made from short twigs. Similarly, the strength and other physical properties of cellulosic fibers are profoundly affected by the lengths of the molecules in the fiber, longer molecules making for a stronger fiber. For some time it has been recognized that cotton and other forms of cellulose are composed of a mixture of long and short molecules. This is true of such compounds as cellulose acetate. Obviously, if it were possible to separate the long and short molecules, and then form new fibers, using only the longer molecules, one would obtain a product of higher strength than the original one composed of both long and short molecules. Research associates of the Textile Foundation, working at the National Bureau of Standards, have succeeded in accomplishing the first step of this process. It is not too much to expect that this fundamental research will lead eventually to the development on a commercial scale of synthetic fibers of a specialized character, having particularly good strength, elasticity, and flexibility.

Cellulose acetate solution of the type used in spinning acetate rayon yarn was used in the researches. By means of a process known as fractional precipitation, the original solution was separated into fifteen parts. Each of these fifteen parts was then studied to determine the length of the molecules and other physical properties.

Essentially, the fractional precipitation process is a

Corner of one of the laboratories at Textile Foundation

simple one. It consists of adding a quantity of Ethyl alcohol to a solution of cellulose acetate in acetone, cooling the solution and separating the gelatinous precipitate and the supernatent solution. The solution is warmed to room temperature, more alcohol added, the solution cooled, and the further precipitate separated from the supernatant liquid. This process is repeated until the desired number of fractions is obtained.

With this process, materials of higher molecular weight are precipitated first, and successive additions of alcohol precipitate materials of lower molecular weight in a progressive manner.

The several fractions (other than the first fraction precipitated which was not completely soluble) were dissolved in Methyl Cellosolve and the viscosity of each was determined. From these determinations, the degree of polymerization which is an index of the lengths of the molecules was estimated. The degree of polymerization of the original material was found to be 194, that of the fraction having highest molecular length 380, and that of the fraction having the lowest molecular length 30. That is the average molecular length of the fraction having

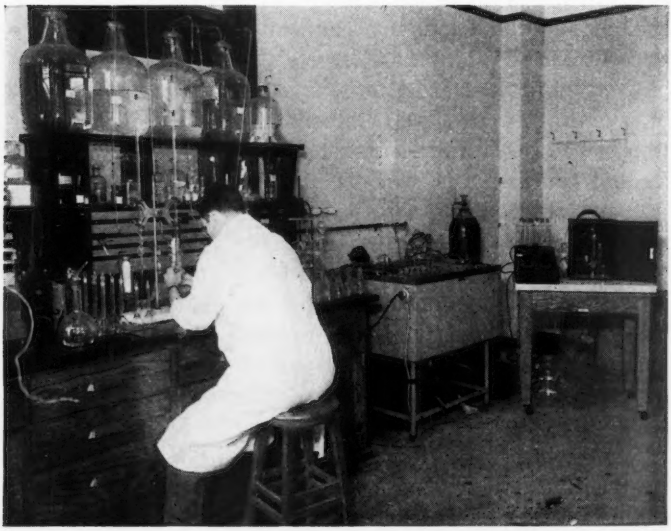
the highest viscosity is more than ten times as great as that of the fraction with the lowest viscosity and just about twice that of the original cellulose acetate.

It was discovered also that a large proportion of the ash and haze-producing materials in the original cellulose acetate is removed in the first fractionation. This indicates that an improvement in the clarity of cellulose acetate films might be effected by a rough fractionation to remove these materials.

The next step in the investigation is, logically, to prepare fibers and films from the various fractions and to determine to just what extent the length of the molecules affects the strength, extensibility, flexibility, and other properties of cellulose acetate fibers and films.

(A detailed report describing the fractionation procedure, and the characteristics of the fractions obtained has been prepared by Arnold M. Sookne, Henry A. Rutherford, H. Mark, and Milton Harris. It will appear in the August, 1942, issue of *Journal of Research*.

View in another of the Foundation's laboratories



Adoption of Standard Test Methods Will Help Solve Problem of

Rotting and Mildewing

CELLULOSE-DESTROYING FUNGI take a huge annual toll by mildewing or rotting of tents, sandbags, tarpaulins, awnings, shower curtains, ropes, cotton in the field, and other products and materials. Prevention of mildewing and rotting—of great importance in peacetimes—is infinitely more important in time of war, when our natural resources are being directed to defense of our life and liberty. Working at the Bureau of Home Economics, U. S. Department of Agriculture, Glenn A. Greathouse, Dorothea E. Klemme, and H. D. Barker, have developed an improved method for comparing the ability of microorganisms to decompose cellulose. Adoption of certain features of this method as a standard for testing the effectiveness of mildewproofing treatments for textiles will, they believe, help solve the problem of rotting and mildewing. Following is an abstract of their original report which appears in the August, 1942 issue of *Industrial & Engineering Chemistry* under the title, "Improvements in Methods for Determining the Deterioration of Cellulose Caused by Fungi."

Deterioration of cellulose may be the result of the action of fungi, bacteria, ultraviolet radiation, chemicals, or a combination of these factors. Molds, as do higher plants, differ greatly with respect to conditions under which they thrive. The popular saying that "one man's poison is another man's drink," might in principle be applied to molds. Treatments that are effective in preventing the development of one may be quite ineffective against another.

In the past much of the effort of research workers has been directed toward a comparison and appraisal of preventive treatments, rather than toward a better understanding of the causes and mechanism of deterioration. Methods of evaluating deterioration have varied so greatly that it is extremely difficult to make accurate comparisons. Below is outlined an improved method for testing the amount and rate of cellulosic decomposition caused by various types of microorganisms. This technique possesses advantages with respect to speed and accuracy over methods previously employed. Further, certain features of this procedure should prove useful in developing a standardized method for testing the effectiveness of rot-proof treatments.

Test Procedure

The principal improvements in this test are the use of liquid instead of mineral agar nutrient, use of glass fabric for supporting the test material and use of glass fabric in lids of large-mouth culture bottles to provide uniform aeration to the cultures.

The individual incubation chamber used in the tests is shown in the accompanying illustration. At upper right are metal cap and wax paper filler with center removed at upper left; glass cloth alone and in place in the metal cap; left-center, unsewed glass wick; right-center, sewed glass wick; bottom, duck strip 6 inches long raveled to 1 inch width; center, individual inoculation chamber with glass wick and duck strip in place.

Individual incubation chambers are 16-ounce square bottles measuring 6½ inches to the neck. Metal screw tops to these bottles were modified to permit a uniform exchange of gases but to exclude any contaminating organisms.

Bleached, 8-ounce Army duck, first treated to remove any substance that might serve as added nutrients, is used as the test material. The fabric is divided into large blocks so that each block will furnish one of the ten

replicates used for each determination. The blocks are cut into strips measuring 6 inches in the warp with a width of 1¼ inches and then raveled to a width of exactly

Individual incubation chamber used in test

1 inch. To keep the strip of cotton duck in contact with the liquid medium and yet to prevent it from being submerged, a $2 \times 6 \times 0.1$ inch mat of glass fabric is placed in each bottle to support the strip and serve as a wick. These mats are made from a material similar to pyrex and thus are not attacked by the organisms.

Sufficient liquid medium is pipetted into each bottle to come up to the upper surface of the glass fabric when in the horizontal position. The liquid in the culture chamber should not submerge the cotton test strip. The bottles after being capped and stacked horizontally are autoclaved for 20 minutes at 15 pounds pressure.

The following liquid nutrient proved to be well adapted to the cellulose-decomposing fungi tested.

K_2HPO_4	1.3940 g.p.l.
$MgSo_4$	0.7395 g.p.l.
NH_4NO_3	1.0006 g.p.l.
$CaCO_3$	0.005 g.p.l.
NaGl	0.005 g.p.l.
Fe, Zn, and Mn, as SO_4	0.001 g.p.l.

By means of a sterile pipette, 1 ml. of the inoculum is transferred to the surface of each strip of test fabric. The strips are then incubated in a darkened, air-conditioned room at 85–86° F. and 90 to 92% relative humidity. An incubation period of 7 days was found to yield the most consistent losses in breaking strength.

For testing the effectiveness of mildewproofing treatments, *Metarrhizium* sp. and *Chaetomium globosum* were found to be superior to the other microorganisms used in the experiments. Under a favorable controlled environment *Metarrhizium* sp. caused 94.9 and *Ch. globosum* 81.5 percent loss in breaking strength at the end of 7 days incubation. NH_4NO_3 as a source of nitrogen appears to be better than $NaNO_3$. The pH of the substrate appears to have an important influence on the activity of cellulose destroying fungi.

Settle the Ramie Question

AN EDITORIAL

► There exists today a confusion of claims and counter-claims regarding the possible production and use of ramie fiber, and affected by an adverse history of attempts to introduce it into this country.

► Would it not seem high time to ascertain whether or not there is sufficient need for ramie fiber to justify diversion of sufficient attention to carry an investigation of the subject through to a conclusion?

► If we find we can get along without ramie, in the event war should continue for several years, let us direct our attention into more useful channels. If, however, the answer to the first question of *sufficient need* is *yes*, it would then seem logical to secure the answer to the following questions:

► FIRST. Is there sufficient evidence of ability to mechanically decorticate and satisfactorily degum ramie to warrant the establishment of a pilot plant to prove that it can be done commercially? If so can the necessary machinery be given priorities for building?

► SECOND. Are the probable costs of growing and processing such that the domestic fiber might promise to compete in a peacetime economy with the foreign product, and with other domestic fibers, natural and synthetic?

► The fact should be borne in mind that it would require at least a year and one half between the start of large-scale cultivation and the quantity production of a commercial quality of the mature stalk.

Julian S. Jacobs

Work of War Council and Research on Warp Sizing Are Continued by

Textile Research Institute

Dr. Milton Harris was recently appointed a member of The Textile Research Planning Committee of the Quartermasters Corps. Other members of this committee are: Major S. J. Kennedy of the Quartermasters Corps, chairman; Colonel Painter, of the Philadelphia Quartermasters Depot; and W. D. Appel, National Bureau of Standards.

The Quartermaster Wool Conservation Board issued the directive to the Textile Research Institute to organize a committee on blankets for the purpose of securing cooperation in making laboratory tests on blankets and to correlate these tests with field tests on all-wool and part-wool blankets which are being considered for army use. A committee has now been appointed by Dr. Harris and consists of the following personnel: Dr. H. F. Schiefer, Chairman, National Bureau of Standards; Lieutenant Walz, Philadelphia Quartermaster Depot; Mr. Fraze, Quartermaster Corps in Washington; Alexis Sommaripa, War Production Board; F. T. Mosedale, United States Testing Co.; A. L. Smith, North Star Woolen Mill Co.; Neil Dow, Bigelow-Sanford Carpet Co. The first meeting of the committee was called by Dr. Harris, July 1, 1942.

It is expected that other panels will be formed to call in representatives of industries as the need arises for other studies.

For further carrying out the purposes of the Re-

Apparatus Used for Testing Warmth of Fabrics

search War Council many specific subjects are under consideration, some of which are military secrets.

Further work is being done in cooperation with the Bureau of Standards on mildewproofing; on fabrics for powder bags made of fibers other than silk; development of fabrics for mosquito bars; prevention of rotting of burlap; the examination of many materials for defects and suggesting means for improvement.

The Textile Research Institute has been authorized by the contributing members of the Warp Sizing Project to further continue the tests at the Textile School at the North Carolina State College, Raleigh, North Carolina.

The present program now in progress will be augmented by a considerable amount of fundamental laboratory studies to be carried out in the laboratories of the Textile Foundation and the Textile Research Institute at the National Bureau of Standards. The work is under general direction of Dr. Milton Harris, Director of Research for The Textile Research Institute and Textile Foundation.

Interchemical Corp. Has Developed Novel Set-Up for

Interrelated Research

TODAY EVEN WELL PLANNED RESEARCH IS NOT NEWS. But a new approach to research is news. And interrelated research is exactly that. Interrelated research is a new approach to an old problem—the problem of so coordinating research in allied fields that new ideas and new discoveries will neither escape nor be pigeon-holed simply because they may not have direct application to the work in hand.

An outstanding example of interrelated research is afforded by Interchemical Corporation. The pattern followed by that company could be equally well applied to other organizations interested in the textile industry. In the field of textiles the discoveries in any given branch may profoundly affect the future of some of the other divisions of the finishing industry.

Group research, as it has been generally applied, does not quite satisfy present day requirements. The development of synthetics with their possibilities for widespread application—along with the war requirements for substitution of new materials for the familiar ones—is rapidly bringing about a further interrelationship between one industry and another.

An example of the difficulty experienced by the average research organization is the experience of Interchemical before establishing its system. This corporation, owning several subsidiaries, operates in a broad field of protective and decorative coatings and printing compositions of all types.

The Hardy recording spectrophotometer in use at research laboratories of Interchemical Corp. This instrument is particularly adapted for testing the infra-red value of camouflage colors.

In the past, the research chemists of the company's ink division, for example, occasionally caught glimpses of fundamentals which applied to other chemical coatings, and which promised radically improved methods or products. But limited by the scope of their own objectives they found it impossible to carry on a long range program of fundamental research. To do a complete job meant studying the endless stream of new synthetic resins, solvents, plasticizers, driers and pigments coming on the market and it meant utilizing precise methods and instruments for measuring the physical characteristics of color, for example. It also meant making certain that no new materials, methods or processes would escape the research staff. So out of this need was developed Interchemical's organization of interrelated research.

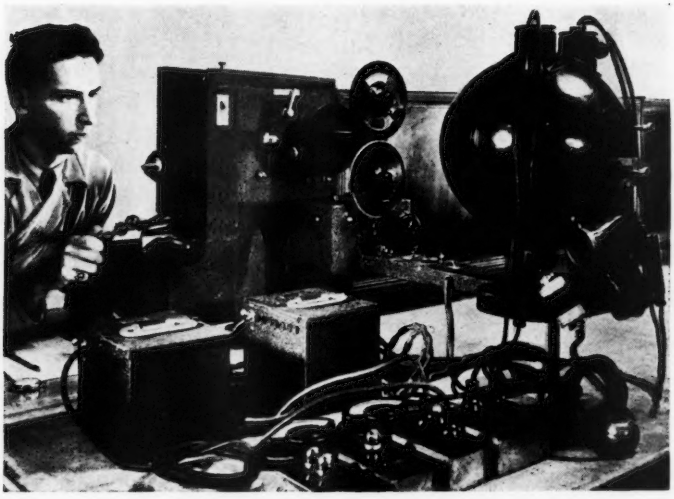
The general functions of the various laboratories are illustrated in the accompanying chart. The first two types—the ink and textile; and the industrial finishes lab-

oratories,—are the end products laboratories. They work on problems immediately related to the business of the subsidiaries and are manned, therefore, by technicians of considerable experience in the corresponding field. No customer contact is had at these laboratories as such problems are handled by the laboratories, located in the subsidiary companies. These end products laboratories clear all problems with the subsidiaries through the research director, to the chairman of the board of directors.

The second group comprises the general and analytical, the organic, the inorganic, and the physical laboratories. These supply the theoretical foundation upon which the end products laboratories base their work, and also undertake the solution of basic research problems common to several of the subsidiary companies.

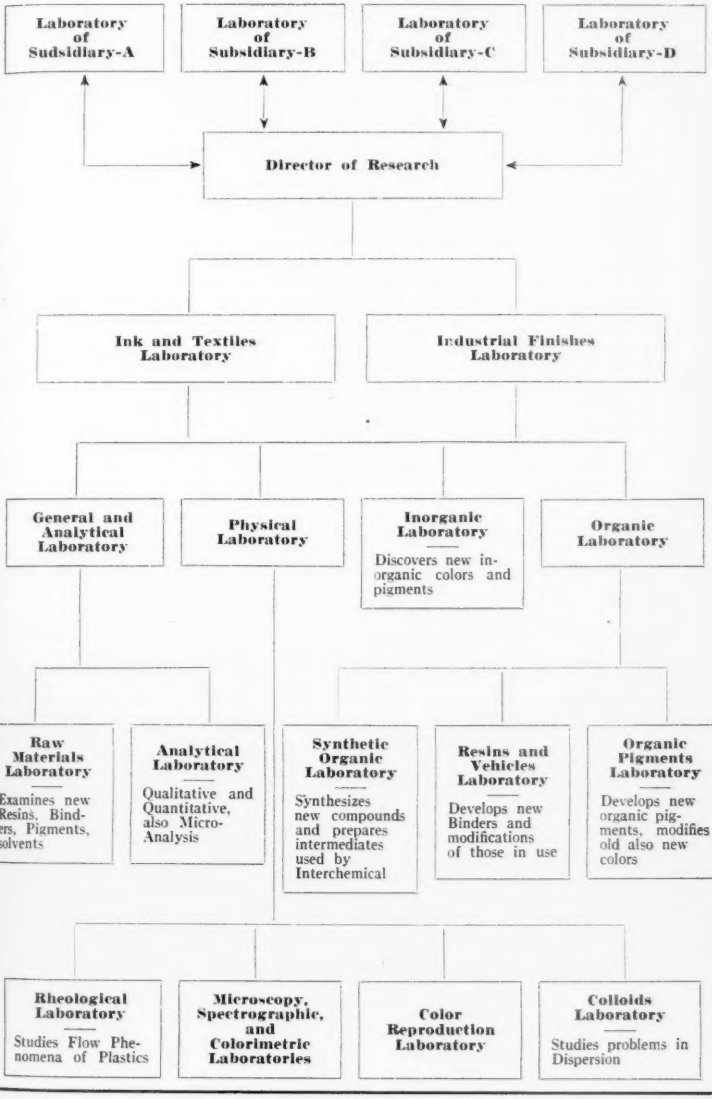
The research laboratories are completely equipped for both fundamental studies and for testing the application of their products. The laboratories include such

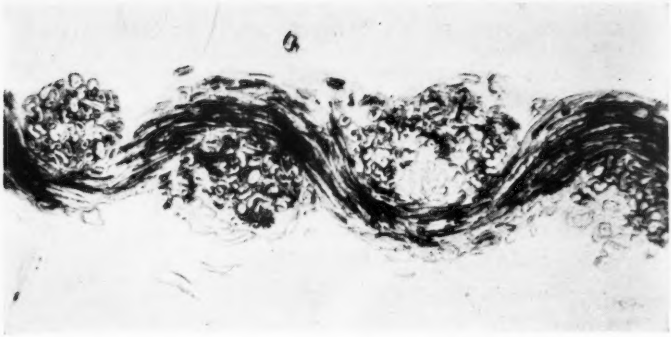
Spectrograph (Bausch & Lomb) equipped with rotating sector photometer and integrating sphere. At research laboratories of Interchemical Corp.



Organization of Research Laboratories Interchemical Corp.

ARROWS ILLUSTRATE FLOW OF IDEAS BETWEEN MAIN LABORATORIES AND SUBSIDIARY COMPANIES


Laboratory of Sudsidiary-A
Laboratory of Subsidiary-B
Laboratory of Subsidiary-C
Laboratory of Subsidiary-D
Director of Research
Ink and Textiles Laboratory
Industrial Finishes Laboratory
General and Analytical Laboratory
Physical Laboratory
Inorganic Laboratory
Discovers new inorganic colors and pigments
Organic Laboratory
Raw Materials Laboratory
Examines new Resins, Binders, Pigments, solvents
Analytical Laboratory
Qualitative and Quantitative, also Micro-Analysis
Synthetic Organic Laboratory
Synthesizes new compounds and prepares intermediates used by Interchemical
Resins and Vehicles Laboratory
Develops new Binders and modifications of those in use
Organic Pigments Laboratory
Develops new organic pigments, modifies old also new colors
Rheological Laboratory
Studies Flow Phenomena of Plastics
Microscopy, Spectrographic, and Colorimetric Laboratories
Color Reproduction Laboratory
Colloids Laboratory
Studies problems in Dispersion



Enlarged section of fabric illustrating application of Aridye color
Photomicrograph by Research Laboratories of Interchemical Corp.

outstanding equipment as the Hardy recording spectrophotometer for analyzing colors; a Bausch & Lomb spectrograph with photometer attachment for determining light reflectance properties in the ultraviolet, the visible and the infra-red regions of the spectrum; and the electron microscope. The laboratories are also equipped with printing and coating machines for testing and determining the best method for application of the various finishes.

The Development of Aridye for Textiles

The success of this fundamental research program was immediately apparent. In a surprisingly short time a number of new products were brought out, among which was one of particular interest to manufacturers of textiles.

This development, the application of pigments for the printing of textiles, came about through a natural sequence: permanent inks had hitherto been used for the stenciling of cloth sugar and flour bags, but the chemists working for the ink division of Interchemical Corp., decided to develop printing inks that would be suitable for dress goods, shirtings and the like. The research lab-

oratories got to work and, as a result, Aridye colors for pigment printing and pigment dyeing were evolved.

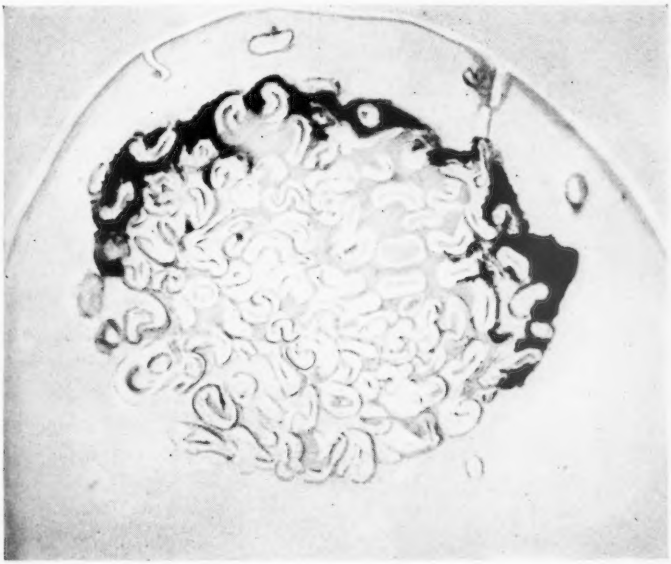
Aridye colors and their successful application have proved to be a development of major importance to the textile industry. First employed for textile printing, Aridye colors for pigment dyeing recently have been developed for the production of fast-color plain shades.

The base of these colors lends itself to the incorporation for simultaneous application of other chemicals, such as mildewproofing, water-repelling, and the like. Progress is also being made in crease-resistant finishes.

Aridye colors are now being used by the armed forces to produce shades of outstanding fastness, particularly on herringbone twill, burlap and osnaburgs and mosquito netting in tricot and marquisette.

Enlarged cross-section of cotton yarn, illustrating application of Aridye color for printing textiles

Photomicrograph by Research Laboratories of Interchemical Corp.



RESEARCH AIDS

Registry Established for Rare Chemicals

The Armour Research Foundation, have established at the Foundation in Chicago, a National Registry of Rare Chemicals which will be a centralized source of information on chemicals too rare to be listed in the catalogues of the regular chemical supply houses. The Registry does not handle the actual chemicals but maintains an indexed file of their sources and supplies. This file will not be open to general inspection but inquiries on specific chemicals will be answered by the registry.

American Made Filter Papers

A complete line of analytical filter papers said to be the equal of any of the finest quality foreign papers are being offered by Carl Schleicher & Schuell Co., 116 West 14th St., New York.

The Electron Microscope

If any one wishes to understand how an electron microscope works he should read this book. It was written by Dr. E. F. Burton and Dr. W. H. Kohl under whose joint direction the first instrument in America was built.

The Electron Microscope * tells the story in non-technical language of the development of the electron microscope, and the simple, logical description of the principles on which it is based. The book is replete with simple diagrams illustrating the behavior of light waves, the theory of the electron, and the effect upon electron streams by electric and magnetic fields. There is also a profusion of photographs showing the structure of many commercially important materials. The book would serve as an excellent text book.

* THE ELECTRON MICROSCOPE—by E. F. Burton and W. H. Kohl; Reinhold Publishing Corp., 330 West 42nd St., New York; 233 p., $3.85.

Twentieth Century Fund Survey Reveals Widespread Research on

Postwar Problems

By FESSENDEN S. BLANCHARD*

OUR MAJOR AND IMMEDIATE INTEREST IS, *of course, concentrated on winning the war, but the far-sighted executive cannot avoid a prudent consideration of what may come afterwards. We have thought it worth while, therefore, to keep our members posted regarding significant research studies which come to our attention concerning possible postwar developments. The following is a brief review of several important publications in this field:*

A study of existing projects and publications on postwar planning in the United States has been recently published by The Twentieth Century Fund [1]—Evans Clark, executive director.

In regard to domestic problems the introduction to the study states—"when the war ends, we will be faced with all the problems of converting defence industries to peacetime production; of providing employment for demobilized soldiers, civilian war workers, and workers in defence industries; of taxation, debt adjustment and fiscal policy; of regional development and balance; and, if our victory is not decisive, of maintaining a fortress economy in a hostile world."

It lists a number of the more important agencies engaged in studies and planning for the postwar period together with the scope of their work and gives a complete bibliography of the best literature applying to this

* President, Textile Research Institute.

subject.

General Electric Company, Schenectady, N. Y., is making a thorough study, including the planning for new projects after the war. David C. Prince, Vice President, has given several talks on this subject—including "Post Defence Readjustments."[2]

I.L.O. Plans World Textile Office

Resolutions were passed by the International Labor Office (formerly in Geneva) at its meeting in New York (Oct. 25 to Nov. 6, 1941) calling for specific studies in postwar planning, including the framing of a scheme for the establishment under the auspices of the I.L.O. of a World Textile Office. (E. J. Riches of this organization recently visited the Textile Research Institute offices to discuss the organization of economic and statistical studies of textile developments.)

An active Research Advisory Service has been established by the Liberty Bank of Buffalo, Buffalo, N. Y., in which 15 banks and over nine hundred research laboratories cooperate. This service has issued a number of publications pertaining to postwar problems, the latest of which is "When the Defense Boom Ends." This article summarizes the replies of leading manufacturers and economists to the following questions:

"What are you doing to prepare to keep up sales volume after the current defense market ceases to exist?"

"What in your opinion should the manufacturer be doing now to prepare to keep up sales volume afterwards?"

Research Programs Are Being Maintained

"The replies reveal certain basic trends of thought. Particularly impressive is the clear recognition of the importance of industrial research for maintaining employment, production, and efficiency when peace returns. Of the three hundred sixty manufacturers giving specific replies, 66% are maintaining or expanding their industrial research programs; 20% have developed new products;

32% are maintaining or increasing their sales staff to improve customer relations; 18% are maintaining or increasing advertising expenditures."

The Market Research Corporation, 444 Madison Avenue, New York, has recently made an inquiry of a representative group of industrial corporations regarding their plans for product research in relation to the present emergency and the postwar period. Replies were received from 42 companies which indicated that manufacturers recognize the severe competitive struggle which will come after the war and are trying to prepare for it in two principal ways: (A)—by technical research in product development, (B)—by market research.

National Bureau of Economic Research, 1819 Broadway, New York, is continuing its researches in income and capital formation, business cycles, production and productivity, prices, wages, finance and fiscal policy. Various publications are planned for 1942 and 1943.

National Industrial Conference Board, 247 Park Avenue, New York, is preparing a program of cooperative research and action among business organizations which includes dealing with postwar problems.

National Resources Planning Board

As part of its work, The National Resources Planning Board, Washington, D. C., has launched a series of pamphlets, the first of which appeared in August 1941,[3] entitled, "After Defence—What?". This pamphlet outlines objectives and invites cooperation. The second pamphlet,[4] is a particularly important one dealing with conditions of full employment and prosperity after the war. It was prepared by Prof. Alvin H. Hansen of Harvard, and is called "After the War—Full Employment." Whether one agrees or not with the economic philosophy expressed in this pamphlet, Prof. Hansen and his ideas are given considerable weight by "the powers that be" in Washington, and for that reason alone, his

writings are worthy of careful study. (A brief outline of this pamphlet will appear in an early issue of TEXTILE RESEARCH.)

Post-Emergency Economic Advisory Commission, 501 Old House Office Bldg., Washington, D. C., was set up under a joint resolution (H. R. Res. 76) to study economic problems after the war. It has published the following: "U. S. Congress, House of Representatives, Hearings Before a Sub-Committee of the Committee on Labor on H. R. Res. 59 and 76, 77th Congress, 1st Session, June 24 to July 1, 1941."

In addition to the report from which we are quoting here, Twentieth Century Fund has sponsored a series of books on postwar possibilities and plans by Stuart Chase. The first [5] of these came out in April 1942 and sold 16,000 copies. The second, "Goals for America: A Budget of our Needs and Resources" will be out shortly. In addition the Fund is considering a detailed study to be called "A Post War Budget for America" which a preliminary outline indicates may prove an important contribution to postwar thinking.

As indicated, only a few of the more important undertakings of interest to our members have been touched on. As further studies appear it is planned to review them in TEXTILE RESEARCH. The ideas expressed in these publications do not necessarily reflect our opinions, but it was thought desirable to bring to the attention of our readers current thinking on postwar problems.

1. "Post War Planning in the United States," by George B. Galloway, price $.60. Twentieth Century Fund, 330 W. 42nd St., New York.
2. "Post Defense Readjustments," by David C. Prince, Construction and Civic Development Dept. U. S. Chamber of Commerce, Washington, D. C.
3. "After Defense—What?," National Resources Planning Board, Washington, D. C.
4. "After the War—Full Employment," by Prof. Alvin H. Hansen, National Resources Planning Board, Washington, D. C.
5. "The Road we are Traveling—1941–42," by Stuart Chase, 112 pages, price $1.00. Twentieth Century Fund, 330 W. 42nd St., New York.

RESEARCH BRIEFS

A NEW CULTURE MEDIUM FOR THE GROWTH OF CHAETOMIUM GLOBOSUM proposes a new formula for a culture medium that is said to cut the time of sporing, increase the quantity of spores produced, and reduce the growth of air borne contaminants without greatly increasing the work of preparation. The article, from the microbiological laboratory of Lowell Textile Institute appears in *American Dyestuff Reporter*, July 1942, p. 331–333.

SOME FUNDAMENTAL PRINCIPLES OF PACKAGE DYEING, discusses factors affecting the results of this type of dyeing for improvement of methods, with special reference to the dyeing of cotton yarn with vat colors. This article by Christian Conradi, appears in *American Dyestuff Reporter*, July 6, 1942, p. 325–330.

TEXTILE FIBERS AND FIBER BLENDING, is the general title under which appear several articles dealing with textile fibers and with chemical developments affecting textiles. One of these articles, "Textiles in the Chemical Age," was written by Perrin N. Collier, vice pres. and research director of Calloway Mills. Among other articles by members of the research staff of the same organization are: "A Review of Chemicals in the Textile Industry," and "Wool—Its Blending, Properties, Processing, and Products." These articles appear in Cotton, July, 1942, p. 61–79.

SULFAMIC ACID, is now an available raw material of industrial importance. The application of sulfamic acid and certain of its salts including its use in connection with the manufacture of certain dyes; its value in

the flameproofing of textiles, and its effectiveness in eradication of such weeds as poison ivy, is described in an article by M. E. Cupery and W. E. Gordon of the du Pont Company appearing in *Ind. and Eng. Chemistry, Ind. Edition,* July 1942, p. 792–797.

CHEMISTRY OF CHLORITES, is a comprehensive review of the chemistry of chlorites. Textiles are among the products whose qualities may be improved by the use of chlorites. This article, by James F. White, Maurice C. Taylor, and Geo. P. Vincent, of Mathieson Alkali Works, Inc., appears in *Ind. and Eng. Chemistry, Ind. Edition,* July 1942, p. 782–791.

STUDY OF THE CREASE-RESISTANCE OF VISCOSE RAYON, is the subject of a thesis submitted for degree of Doctor of Philosophy by Nathan Sugarman, Behr-Manning Fellow, at the Virginia Polytechnic Institute, Blacksburg, Va. An abstract of this thesis appears in *Rayon Textile Monthly,* July 1942, p. 57 (391)–58 (392).

DERIVATIVES OF STARCH, illustrates by means of diagrams and tables some of the properties of the acetyl derivatives of starch and appears in *Rayon Textile Monthly,* July 1942, p. 90 (416)–93 (419).

THE DYEING OF CELLULOSE ACETATE RAYON WITH DISPERSED DYES, seems to be practically the first published quantitative work on the mechanism of dyeing with water-insoluble dispersed dyes. It describes experiments carried out in the dyeing of acetate rayon with pure anthraquinone derivatives by T. Vickerstaff and E. Waters of I. C. I. (Dyestuffs) Ltd., and reported in *Journal of the Society of Dyers and Colorists,* July 1942, p. 116–125.